

# **Meteorological data from ice-free areas in Yukidori Zawa, Langhovde and Kizahashi Hama, Skarvsnes on Sôya Coast, East Antarctica during December 2014 - December 2016**

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**Abstract:** Meteorological data recorded by automatic weather stations (AWSs) installed at ice-free areas in the middle of Yukidori Zawa and near the coast of Kizahashi Hama during the JARE-56–58 (2014–2016) was summarized in tables and figures. Almost two-year data of air temperature, relative humidity, air pressure, wind conditions, solar radiations including photosynthetically active radiation and ultraviolet radiation were compiled in 3 text files from each AWS:10-min; 1-hr and daily.

## **1. Background and summary**

This report presents meteorological data recorded by automatic weather stations (AWSs) in Yukidori Zawa (Yukidori Valley), Langhovde, and in Kizahashi Hama, Skarvsnes on the Sôya Coast of East Antarctica, between the Japanese Antarctic Research Expedition 56 (JARE-56) in December 2014 and JARE-58 in December 2016. This study, part of the National Institute of Polar Research (NIPR) project “Monitoring of terrestrial ecosystems (mission code; AMB)” had recorded environmental conditions for terrestrial organisms research in several major ice-free areas of Syowa

Oasis since 2009. The AWSs continuously monitored wind speed and direction, air temperature, relative humidity, solar radiation, photosynthetically active radiation (PAR), ultraviolet radiation (UV), and air pressure, and logged them automatically at intervals of 10 min, one h, and one day. Previously we reported these data in JARE Data Reports<sup>1;2;3</sup>. Using the meteorological data obtained from the previous observations and those at Syowa Station, meteorological features in the ice-free areas had also been discussed<sup>4</sup>.

## 2. Locations

Yukidori Zawa, a name of a valley in central Langhovde, is Antarctic Specially Protected Area No. 141, where a fertile community of mosses and lichens distributes ice-free areas along a seasonal stream in Syowa Oasis<sup>3</sup>. An AWS was installed at a flat site beside the middle stream of the valley at 69° 14' 28" S, 39° 44' 21" E as determined by a handy GPS (GPS Map62, Garmin), approximately 53 m above sea level ([Fig. 1](#)). Another AWS was installed at a coastal site in the southeastern part of Kizahashi Hama, a sandy beach in central Skarvsnes, at 69° 28' 25" S, 39° 36' 43" E at an elevation of ca. 3 m ([Fig. 1](#)).

## 3. Methods

Each AWS consisted of a data logger (CR1000-4M-XT, Campbell Scientific, USA), an anemometer (05103, Young, USA), a hydro-thermometer (HMP155D, Vaisala, Finland), a solar radiation sensor (PCM-01(L), Prede, Japan), a PAR sensor (PAR-01(L), Prede, Japan), a UV-sensor (CUV5, Kipp & Zonen, Germany), a barometer (PTB210, Vaisala, Finland), and six sets of lithium ion batteries (TL5930/T, 3.6 V, four cells connected in series for a total of 14V) capable of supplying 3 years of electric power (19Ah) to the system. The logger, barometer and batteries were stored in a plastic container (Pelican Products, USA), and the other sensors were mounted on a tripod. All sensors had been pre-calibrated by a manufacturer (CS Tokki Co., Sapporo, Japan), and confirmed the accuracy within the specifications of each sensor, which had been listed in the table of the previous report<sup>1</sup>. The accuracy the anemometer was  $\pm 0.3$  m/s (range: 0–60 m/s) in wind speed and  $\pm 3$  degree in wind direction, the hydro-thermometer was  $\pm 0.2^\circ\text{C}$  and  $\pm 2\%$  at  $22^\circ\text{C}$ , the solar radiation sensor was  $\pm 3\%$  (range: 0–1000 W/m<sup>2</sup>), PAR sensor was  $\pm 5\%$  (range 0–3000  $\mu\text{mol}/\text{m}^2/\text{s}$ ), UV sensor was  $\pm 5\%$  (range: 0–400 W/m<sup>2</sup>), and the barometer was  $\pm 0.30$  hPa at  $20^\circ\text{C}$  (range: 800–1060 hPa). The AWS at Yukidori Zawa was installed on 25 December 2009; that at Kizahashi Hama was installed on 2 February 2010, and the data retrieval, maintenance of the AWSs, and exchange of the sensors had been carried out occasionally when serious damages were found. Data collection and changing the batteries had been done at least within every two years since 2010.

#### 4. Data Records

Every 10 min, the logger compiled a data file containing 10-min average of wind speed, vector wind direction, and radiations (solar radiation, PAR and UV), and instantaneous values of temperature, relative humidity, and air pressure. Every 60 min, it compiled 60-min averaged wind speed, vector wind direction and radiation data, and instantaneous values of temperature, humidity and air pressure at recorded time. Also, every 24 h it created a summary of daily average wind speed and vector wind direction, temperature, humidity, solar radiation, PAR, UV and air pressure. This file also included the daily maximum wind conditions (speed and direction) with a time stamp, the maximum and the minimum values of temperature, humidity, air pressure with time stamps. We retrieved the data files during the JARE-58 summer season program. We have converted the 10-min, 60-min and 24-h data from the AWS data loggers to CSV files from 1 December 2014 to 31 December 2016 for Yukidori Zawa, from 1 December 2014 to 25 December 2016 for Kizahashi Hama, respectively. Nearly two months data from 1 December 2014 to 31 January 2015 of Yukidori Zawa, and the data from 1 December 2014 to 10 January 2015 of Kizahashi Hama have been reported<sup>2</sup>, however, we listed here again to check the continuity of the data before/after our maintenance which had been conducted on 31 January 2015 at Yukidori Zawa, and on 13 January 2015 at Kizahashi Hama. ([Table. 1](#))

Following is the list of data files.

1. Data from Yukidori Zawa AWS

- 1-1 10-min\_data\_Yukidori2014D-2016D.csv

- 1-2 1-hr\_data\_Yukidori2014D-2016D.csv

- 1-3 1-day\_data\_Yukidori2014D-2016D.csv

2. Data from Kizahashi Hama AWS

- 2-1. 10-min\_data\_Kizahashi2014D-2016D.csv

- 2-2 1-hr\_data\_Kizahashi2014D-2016D.csv

- 2-3 1-day\_data\_Kizahashi2014D-2016D.csv

#### 5. Technical Validation

When we were carrying out the maintenance (on 31 January 2015 at Yukidori Zawa, 13 January 2015 at Kizahashi Hama), some radiation sensors were removed for a short time and changed new sensors, then, no data period occurred (flagged as NAN, in the daily averaged data tables because of data lacking for the calculation of daily average). We noticed the data of vector wind direction at Yukidori Zawa had been recorded against magnetic north (49° shifted westward to true north), then we corrected the data by subtracted 49 degrees.

Examples of quick look results, such as air temperature, solar radiation and wind conditions for

two years using the daily averaged data from both sites, are shown in [Figures 2](#) and [3](#).

## **6. Usage Notes**

Before using the data for publication or presentation in any media, please request permission in writing. Inquiries should be addressed to

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## 7. Figures

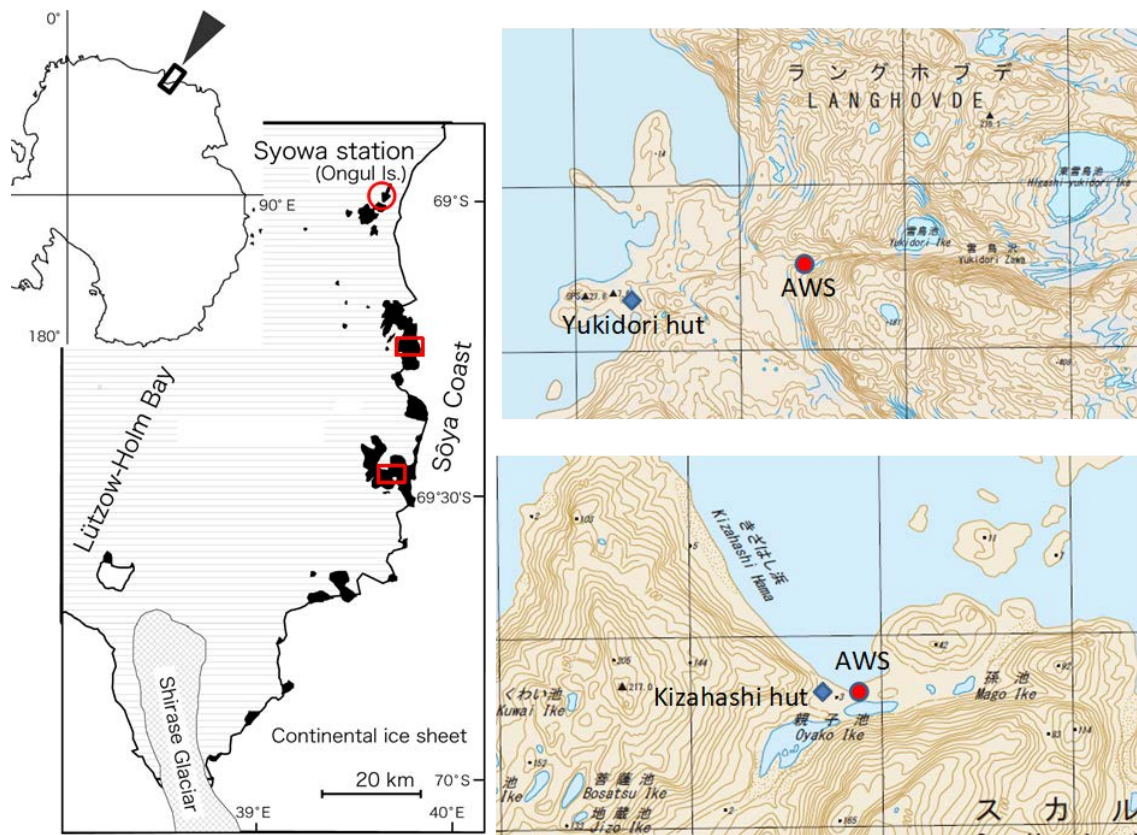


Fig. 1. Maps of AWS sites. The left panel is a location map of Syowa Oasis (ice-free areas shown in black) on the Sôya Coast, East Antarctica. Right panels indicate the positions of Yukidori Zawa AWS (top) and Kizahashi Hama AWS (bottom). Locations are outlined in red squares in the left panel.

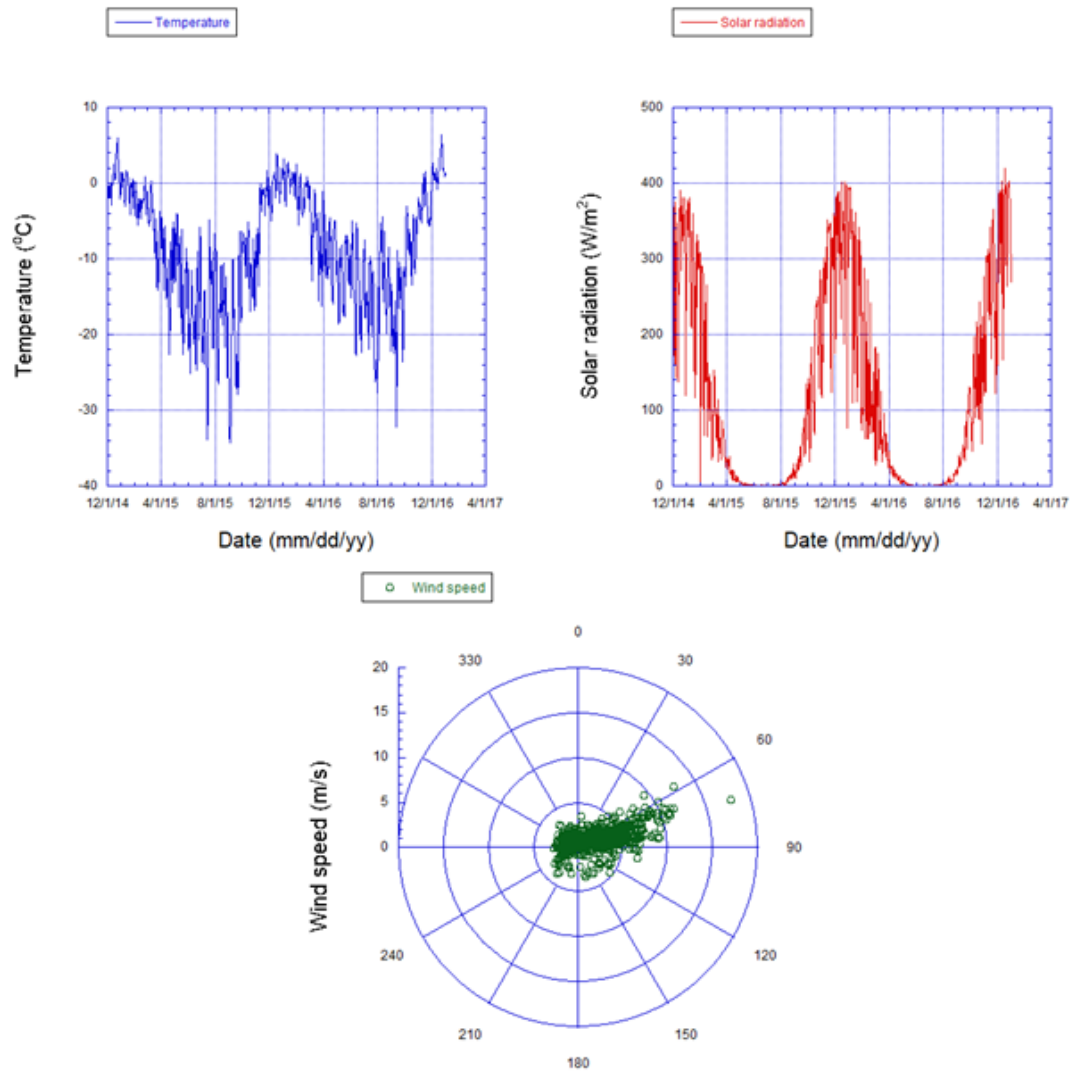


Fig. 2. Examples of graphical expressions of daily averaged data of air temperature (top left), solar radiation (top right), and wind conditions (bottom) recorded at Yukidori Zawa from 1 December 2014 to 31 December 2016. Solar radiation on 31 January 2015 was zero due to daily averaged data cannot be calculated for maintenance.

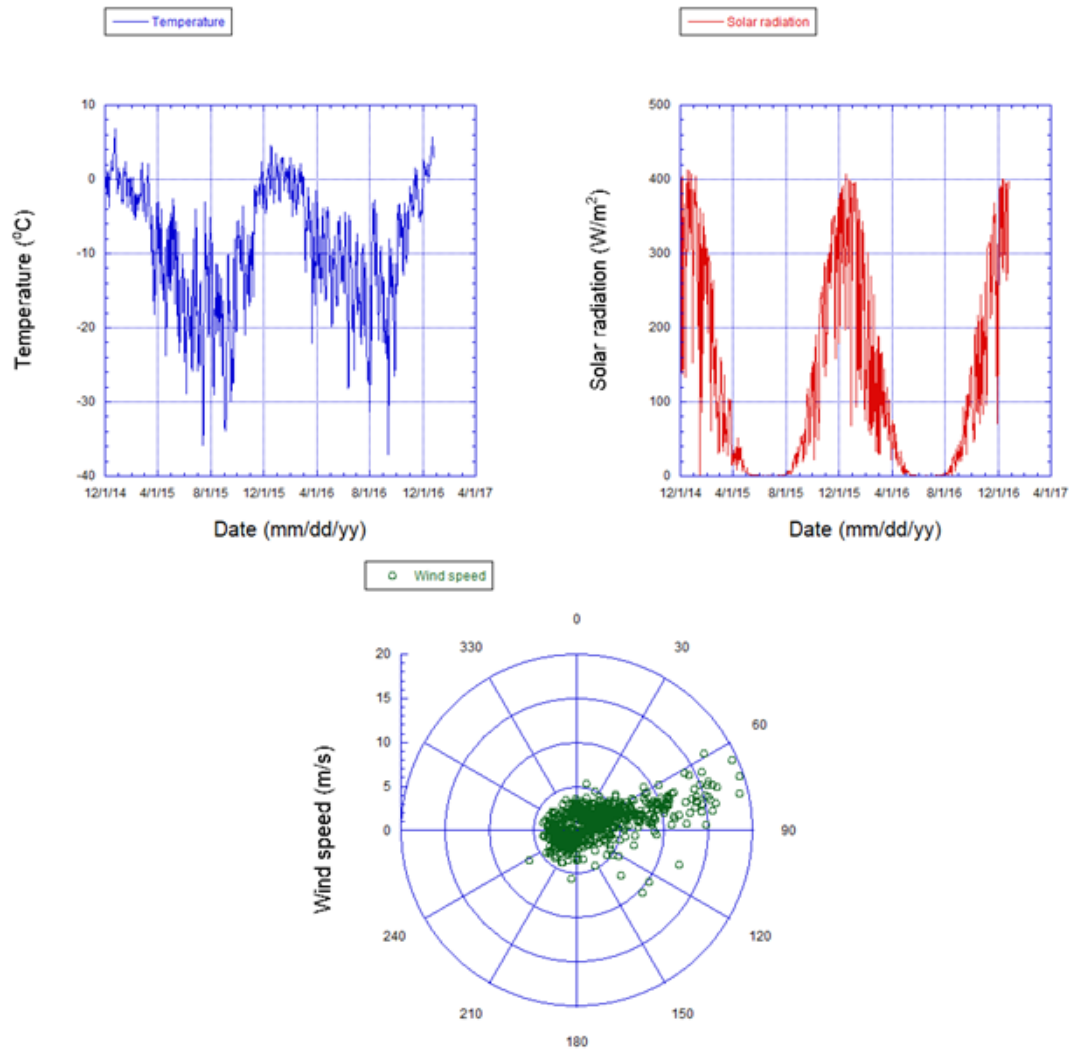


Fig. 3. Examples of graphical expression of daily averaged data of air temperature (top left), solar radiation (top right), and wind conditions (bottom) recorded at Kizahashi Hama from 1 December 2014 to 25 December 2016. Solar radiation on 13 January 2015 was zero due to daily averaged data cannot be calculated for maintenance.

## 8. Table

Table 1. An example of the 10-min data format. Column 1 is time stamp (yy/mm/dd hh:mm, local time), 2 is wind speed (m/s), 3 is vector wind direction (degree from true north), 4 is air temperature (°C), 5 is relative humidity (%), 6 is solar radiation (W/m<sup>2</sup>), 7 is photosynthetic active radiation (PAR,  $\mu\text{mol/m}^2/\text{s}$ ), 8 is UV radiation (W/m<sup>2</sup>), and 9 is air pressure (hPa). The format (number of column) for 1-hr data is the same as this table.

<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>
TIME STAMP	Wind speed	Vector wind direction	Air temperature	Relative humidity	Solar radiation	PAR	UV	Air pressure
2014/12/1 0:00	5.8	58	-2.8	63	8	22	0.4	974
2014/12/1 0:10	5.9	57	-2.9	64	7	20	0.4	973
2014/12/1 0:20	5.7	64	-2.8	63	6	17	0.4	973



### Members who carried out the field study

Sakae Kudoh, Yukiko Tanabe, Masaki Uchida and Takashi Osono installed the AWSs during the JARE-51 summer. Yukiko Tanabe, Morimaru Kida, Kentaro Hayashi and Nobuhide Fujitake carried out the data acquisition during the JARE-58 summer.

### Acknowledgments

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### References

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### Data Citations

Sakae Kudoh, Yukiko Tanabe, Kentaro Hayashi, Morimaru Kida, Nobuhide Fujitake, Masaki Uchida, Satoshi Imura. Meteorological data from ice-free areas on Soya Coast, East Antarctica. 1.00, Arctic Data archive System (ADS), Japan, 2019. <https://doi.org/10.17592/001.2019060301>